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instruction book

479X-2
Resolver Zeroing Panel

For indexing resolvers used on navigation receivers and other equipments using rotor feed systems, by use of the ORZ method.

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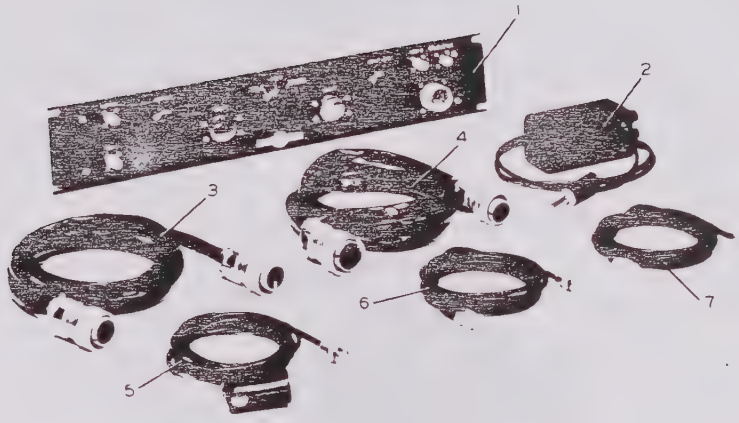


1. 479X-2 Resolver Zeroing Panel
2. 30-cps filter
3. Omnibearing indicator (OBI) cable
4. Omnibearing selector (OBS) cable
5. Voltmeter cable
6. Variable phase cable
7. Reference phase cable

Figure 1-1. 479X-2 Components

section 1

general description

1.1 General.

The 479X-2 Resolver Zeroing Panel (522-0167-001) consists of the items shown in figure 1-1 above.

The 30-cps filter has two banana plug output terminals which may be connected to the vertical input terminals of an oscilloscope. The coaxial input cable of the filter is fitted with a phone plug for connection to the AC OUTPUT jack of a Ballantine voltmeter, such as the model 300 or 300A.

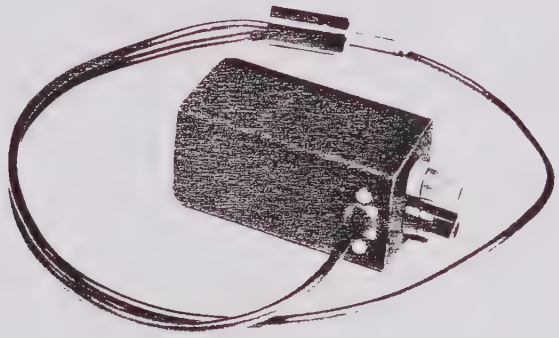


Figure 1-2. 30-CPS Filter

Cables are provided for connecting the omnibearing indicator, the omnibearing selector, the Balantine voltmeter and the output of the 479S-1, 479S-2, or 479S-3 Audio Signal Generator, or other signal source, to the 479X-2 Resolver Zeroing Panel.

1.1.1 DESCRIPTION.

The 479X-2 Resolver Zeroing Panel provides a method whereby resolvers which are used in connection with onmirange service can be adjusted to give uniform results when the omnibearing selectors and omnibearing indicators using them are interchanged. The 479X-2 was devised to permit omniresolver zeroing (ORZ) procedures to be carried out with a minimum of complicated test equipment, relying principally on conventional test equipment, such as voltmeters, oscilloscopes, and audio signal generators.

The latest RTCA recommendations for the zeroing of resolvers are outlined in RTCA Paper No. 126-54/SC61-65, Calibration Procedures for Test Standard Omnibearing Selectors and Omnibearing Selector Test Sets Used in the Testing of VOR Receivers and Omnibearing Selectors. This paper describes the latest standards and procedures for use in indexing resolvers. The 479X-2 Resolver Zeroing Panel is mentioned in this paper as a means for obtaining the necessary standard conditions for ORZ.

The 479X-1, the predecessor of the 479X-2, is based on a different set of standards and cannot be used to produce an ORZ in accordance with the latest RTCA paper. On the average, resolver ORZ will be off by approximately 0.3 degree when the 479X-1 is used. Individual resolvers may deviate from the correct ORZ by as much as 1.5 degrees.

section 2

installation

2.1 General.

The 479X-2 Resolver Zeroing Panel (figure 2-1) is 3-1/2 inches high by 19 inches wide. It is intended for mounting in a standard 19-inch relay rack.

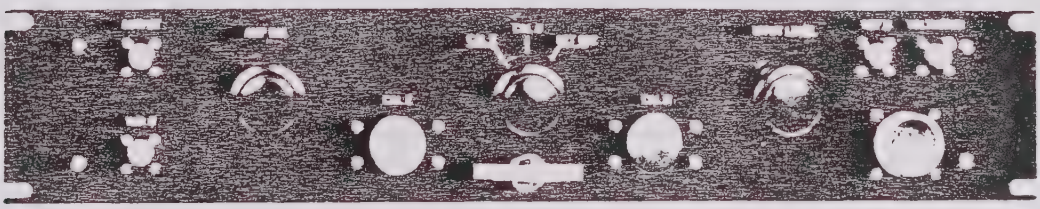


Figure 2-1. 479X-2 Panel

section 3

operation

3.1 Omniresolver Zeroing.

3.1.1 GENERAL.

The resolvers used in track selectors and bearing indicators associated with the airborne vhf omnidirectional range receiving equipment require a standard method of zeroing if satisfactory instrument interchangeability is to be achieved. A method of setting electrical zero (EZ) is prescribed in Bulletin No. 512-29D of the Eclipse-Pioneer Instrument Division of Bendix Aviation Corporation. For sine-cosine generator service in which the ratio, but not the relative phase, of the induced secondary voltages is of importance, the method cited above is very satisfactory. However, in omnirange equipment, the relative phase angle between primary (rotor) and secondary (stator) voltage is critically important, not the EZ.

The method of setting EZ for resolvers as mentioned in the Eclipse-Pioneer literature will yield an ORZ which is reliable to within approximately ±1 degree. This applies when using

the resolver identified as Collins part no. 230-0077-00 (Eclipse-Pioneer AY-241-5-A or AY-241-5-B). With Kearfott resolvers, the error will be much greater. Manufacturing and material variations prevent the EZ from conforming with the ORZ. The difference between EZ and ORZ is the result of small variations of inductance of the primaries of different resolvers. These irregularities stem largely from variations in the permeability of the laminations in the resolver structure and minute variations in the air gaps between rotor and stators.

It is of utmost importance that the ORZ of a resolver be set under standard conditions to reduce error to a minimum. The standard conditions agreed upon are obtained with the rotor excited at 30 cps, using a 2000-ohm resistor in series with the rotor and generator. With the rotor excited as described, the induced voltage in the stator leads the generator voltage by approximately 83 degrees. By general agreement of the members of the RTCA, this phase relation has been standardized as 83 degrees. The 479X-2 is designed to provide these standard conditions.

It having been agreed between the military (USAF) and the commercial aviation interests (ARINC) that the dials of omnibearing selectors (OBS) and omnibearing indicators (OBI) read 300 degrees when the resolver zeroing obtains, it is necessary that a prescribed uniform phase shift through the resolver circuit be achieved. Since the resolver, as used in connection with the omnirange receivers, is a phase-shifting device, this uniform phase shift may be achieved by displacing the resolver stator windings from EZ by a slight amount provided the dial and resolver shaft are held in a fixed position and the resolver is excited in a manner which adequately simulates the excitation system used in the receiver.

section 4

principles of operation

4.1 Resolver Theory.

4.1.1 GENERAL.

A resolver is a sine-cosine generator used in omnirange receivers to produce an angular phase shift that is precisely equivalent to the angular position of its shaft. Briefly, the operation of a resolver is as described in the following paragraphs.

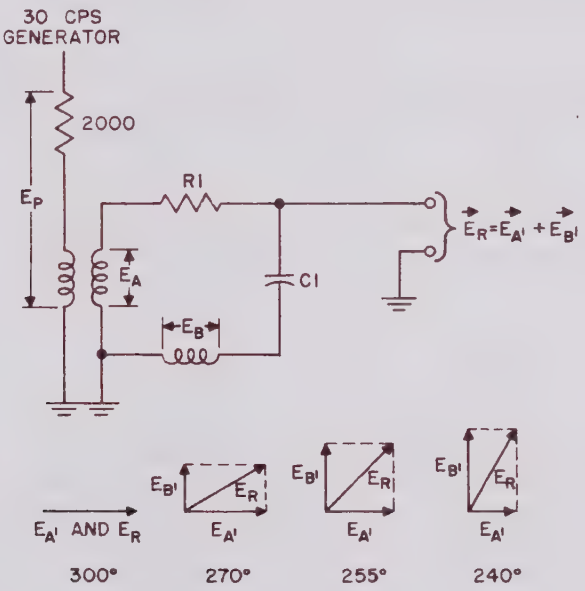


Figure 4-1. Resolver Circuit

Refer to figure 4-1. The following discussion is based upon an "electrically perfect" resolver used in omnirange service. A 30-cps generator voltage (E_p) is applied to the rotor of the resolver through a 2000-ohm resistor. The current in the rotor induces voltages in the stator windings. These induced voltages are labeled E_A and E_B. The voltages E_A and E_B lead the generator voltage by approximately 83 degrees or 83 + 180 degrees depending upon the rotor position. The amplitudes of these voltages depend upon the angular position of the rotor. Due to the position of the windings, when E_A is fully coupled to the rotor, maximum voltage is induced at E_A and minimum voltage is induced at E_B. Omnibearing selectors and omnibearing indicators are indexed so that these voltage relations occur near 300 degrees

and 120 degrees (300 - 180 degrees). If the rotor is turned 90 degrees to the 210- or 30-degree positions, the voltage at E_B becomes maximum, and the voltage at E_A becomes minimum. As the rotor is rotated, the amplitudes of voltages E_A and E_B vary regularly as the cosine and sine, respectively, of the angular position of the rotor with respect to a dial reading of 300 degrees. The phase of E_A and E_B does not vary with angular rotation of the rotor.

Induced voltage E_A produces a voltage at the output which will be called E_A'. Induced voltage E_B produces a voltage at the output which will be called E_B'. An RC network consisting of equal resistance and reactance (R1 and C1) is connected between the stator windings and the output. Due to the action of this RC network, voltage E_A' lags voltage E_A by 45 degrees and voltage E_B' leads voltage E_B by 45 degrees. Voltages E_A' and E_B' are therefore in phase quadrature.

In obtaining the above relationships, the following facts are of importance: the inductance of the stator windings is very small in comparison with the resistance of R1 and the reactance of C1; and the load impedance connected across the output is considered to be infinite.

These two voltages, E_A' and E_B', added vectorially, combine to produce an output that changes in phase, degree for degree, with the angular rotation of the rotor of the resolver. This relationship is shown in figure 4-1 for resolver rotor positions of 300, 270, 255, and 240 degrees.

A practical resolver may not have an exact 83-degree relationship between the generator voltage and its stator voltage. This variation from the ideal is compensated when a resolver is indexed by the ORZ method.

4.2 479X-2 Theory.

4.2.1 GENERAL.

An ORZ may be produced by the method shown in figure 4-2. A 30-cps generator is used to excite the rotor of the resolver through a 2000-ohm swamping resistor. When the resolver is connected to the 479X-2, the rotor leads are reversed from the connections used in omnirange receivers. This means that the 83-degree phase difference between the generator voltage and the resolver stator output specified in omnirange service will now become an 83 + 180 degrees or 263-degree phase relationship while the resolver is connected to a 479X-2 for indexing.

The 30-cps generator which feeds the resolver rotor also supplies voltage to a phase-shifting network. During calibration of the 479X-2, the phase-shifting network is adjusted to provide a voltage between point B and ground that leads the generator voltage by 83 degrees. If a voltage appears at point A that is 180 degrees out of phase with the voltage at point B (that is, 263 degrees with respect to the generator voltage), a null will be obtained at the null detector if an amplitude balance is achieved between the two voltages. This circuit can therefore be used to determine whether the proper standardized phase shift has been obtained through a resolver and to adjust the resolver for this proper standardized phase shift.

Provided that R10 equals R15, a null can be obtained with the voltages at points A and B 180 degrees out of phase, no matter whether the load presented to the circuit by the null detector, capacitors, and stator winding in parallel with it is resistive or reactive.

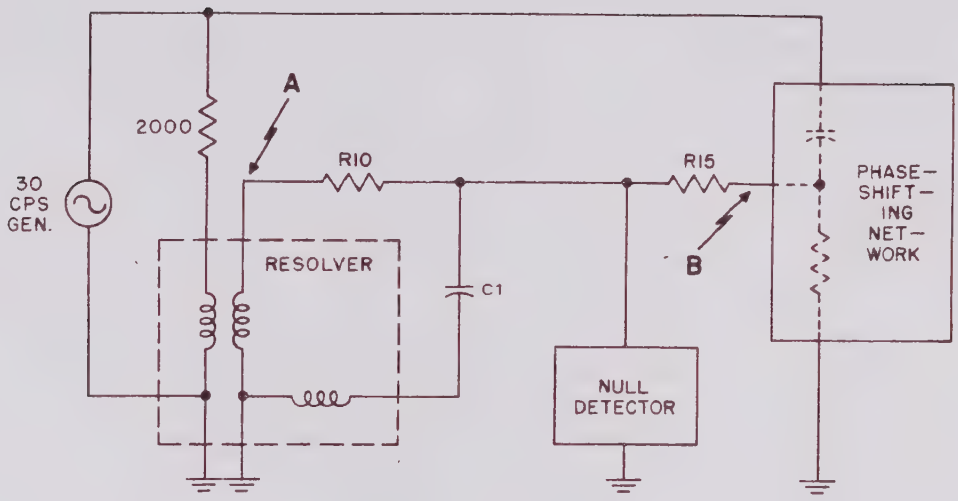


Figure 4-2. 479X-2 Basic Theory

In a practical resolver, the voltage in the stator may lead the generator voltage by somewhat more or less than 83 degrees when the resolver is connected for omnirange service. With the rotor terminals reversed as they are when the resolver is connected in a 479X-2, the voltage at point A may lead the generator voltage by approximately 83 +180 degrees (263 degrees). Since this voltage may not be exactly out of phase with the voltage output of the phase-shifting network, a phase-correcting voltage needs to be generated and added to the circuit, across the null detector, to allow a null to be reached.

The phase-correcting voltage is generated by changing the position of the stator with respect to the rotor until the proper amount of voltage is obtained from the stator winding connected to C1 to produce a null. The resolver has now been indexed by the ORZ method.

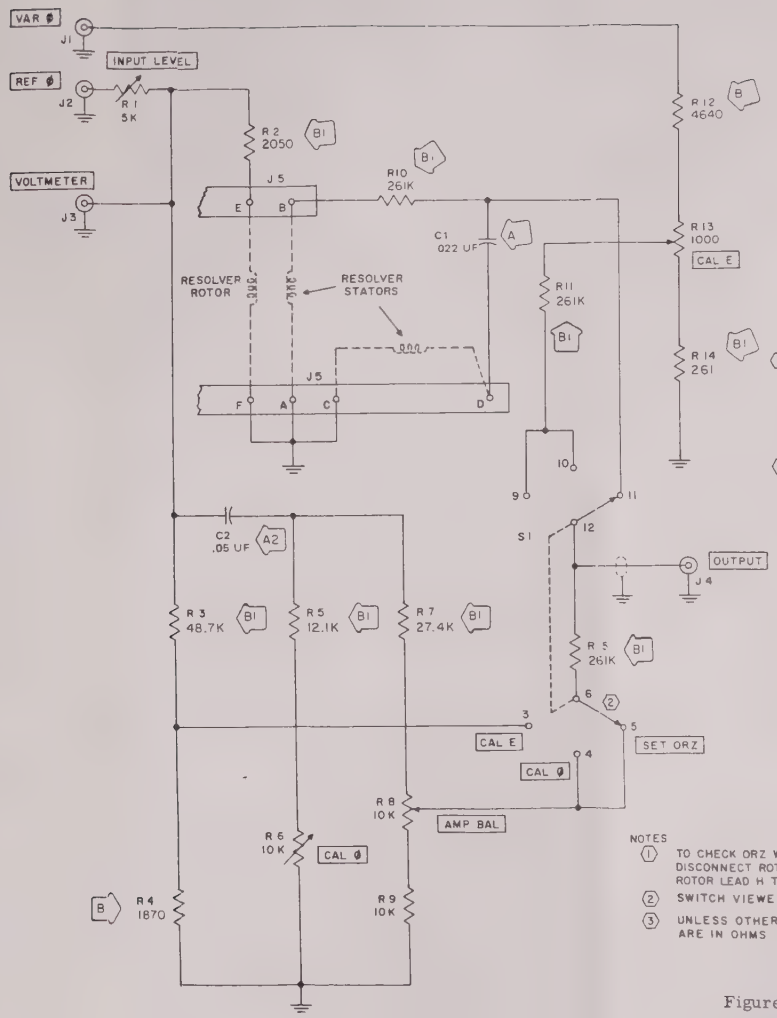
The 479X-2 operates in accordance with the principles above. Circuit details of the 479X-2 are shown in figure 4-3. For calibration of the phase-shifting network, 30-cycle variable phase and 30-cycle reference phase signals are fed to VAR Ø jack J1 and REF Ø jack J2 respectively. The signals are obtained from a 479S Audio Signal Generator. Selector switch S1 on the 479X-2 is set to the CAL E position, and INPUT LEVEL control R1 is adjusted for proper voltage at VOLTMETER jack J3. When the phase dial on the 479S-3 Audio Signal Generator is adjusted to secure a 180-degree relationship between the variable phase and reference phase signals, a null may be obtained by adjustment of CAL E control R13.

The 479S-3 Audio Signal Generator dial is then set to a position 83 degrees less than the position described in the paragraph above, S1 is set to the CAL Ø position, and the phase-shifting network is adjusted by use of the CAL Ø control to produce a 180-degree relationship between the output of the phase-shifting network and the variable phase signal supplied

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A1	Changed C1 and C2 combination (0.01 μF each) to C1 (0.022 μF).		Rev ltr J
A2	Changed C3, C4, C5, C6, and C7 combination (0.01 μF each) to C2 (0.05 μF).		Rev ltr J
B1	Changed R2 from 2000 to 2050 Ω; R3 from 47 to 48.7 kΩ; R4 from 1800 to 1870 Ω; R5 from 12 to 12.1 kΩ; R7 from 27 to 27.4 kΩ; R10, R11, R14, and R15 from 267 to 261 kΩ; and R12 from 4700 to 4640 Ω. All changes were for production standardization ease.		CI 73026

Figure 4-3. 479X-2, Schematic Diagram (Sheet A)



ARINC NOTATION	479X-2 CONNECTOR J5
① ROTOR LEAD A	F
ROTOR LEAD B	NOT USED FOR ORZ
ROTOR LEAD C	E
STATOR LEAD D	B
STATOR LEAD E	A
STATOR LEAD F	D
STATOR LEAD G	C
① ROTOR LEAD H	F

NOTES
① TO CHECK ORZ WHEN INSTRUMENT CONTAINS EZ/ORZ CHOKE, DISCONNECT ROTOR LEAD A FROM J5 PIN F AND CONNECT ROTOR LEAD H TO J5 PIN F
② SWITCH VIEWED FROM KNOB END
③ UNLESS OTHERWISE INDICATED; ALL RESISTANCE VALUES ARE IN OHMS

Figure 4-3. 479X-2, Schematic Diagram

by the 479S-3 Audio Signal Generator. The 180-degree relationship is verified when a null can be obtained by adjusting the signal amplitude by use of AMP BAL control R8. This procedure sets the phase-shifting network so that its output voltage will lead the generator voltage by 83 degrees.

The variable phase signal can now be disconnected and any stable, low-distortion 30-cps generator can be connected to REF Ø jack J2. The 479X-2 now may be used to set the ORZ of resolvers. Selector switch S1 is rotated to SET ORZ, and INPUT LEVEL control R1 is adjusted to provide the proper voltage at VOLTMETER jack J3. The resolver stator-to-rotor position is changed until a null can be obtained by adjustment of AMP BAL control R8. The resolver has now been properly indexed. All resolvers indexed by this technique will produce a uniform phase shift when used in rotor-feed resolver circuits.

4.3 Calibration.

4.3.1 GENERAL.

The following calibration instructions will adjust the 479X-2 to properly set ORZ on all resolvers except Kearfott resolvers used in conjunction with both Collins 51R and competitive receivers. Customers using Kearfott resolvers with both Collins 51R and competitive receivers are urged to consult RTCA Paper No. 126-54/SC61-64 for indexing information.

a. Connect the equipment as shown in figure 4-4. The variable phase signal from the MOD OUTPUT connector of the 479S-3 is obtained with the function selector switch set to SPECIFIC SIGNAL and SPECIFIC SIGNAL SELECTOR set to 30 cps VAR Ø. The signal level is set by adjusting the master attenuator and/or R138 located behind the access door of the 479S-3 for approximately 1.5 volts measured at the VAR Ø connector on the 479X-2. The reference phase level is adjusted by R151 located under the 479S-3 access door and should be about 7 volts but can be as low as 3 volts (for calibration only), and is measured at the REF Ø connector on the 479X-2. The oscilloscope is fed from the AC OUTPUT phone jack of the vtvm amplifier into the 30-cycle filter.

b. Adjust the INPUT LEVEL control for a level of 4.25 volts at the VOLTMETER jack if possible. If 4.25 volts is not available, a lower voltage may be used for calibration if the null detector has sufficient gain. After voltage level is obtained, remove the lead from the 479X-2 VOLTMETER jack, and connect it to the 479X-2 OUTPUT jack. In the process of obtaining a null in subsequent steps, it will be found advantageous to start with the gain of the vtvm relatively low, using a constant oscilloscope gain. As a null in voltage is approached, the gain of the vtvm should be increased appropriately.

c. Turn the selector switch to CAL E, and adjust the CAL E potentiometer and the VOR audio signal generator phase dial while observing the oscilloscope for a null. This will occur near 180 degrees. Note the reading. The null detector sensitivity should be high enough to cause an appreciable indication when the VOR audio signal generator phase dial is turned 0.1 degree away from a null position. When setting the VOR audio signal generator phase dial for a null, approach the null in the same direction each time to minimize possible errors due to dial backlash.

d. Turn the selector switch to CAL Ø, and set the 479S-3 phase angle selector dial for a reading 83.0 degrees less than the reading noted above.

e. Adjust the AMP BAL control for the best null obtainable. If a good null is not obtained, reset the CAL Ø control slightly in one direction. Again adjust the AMP BAL control for a null, and note whether the null is better or not.

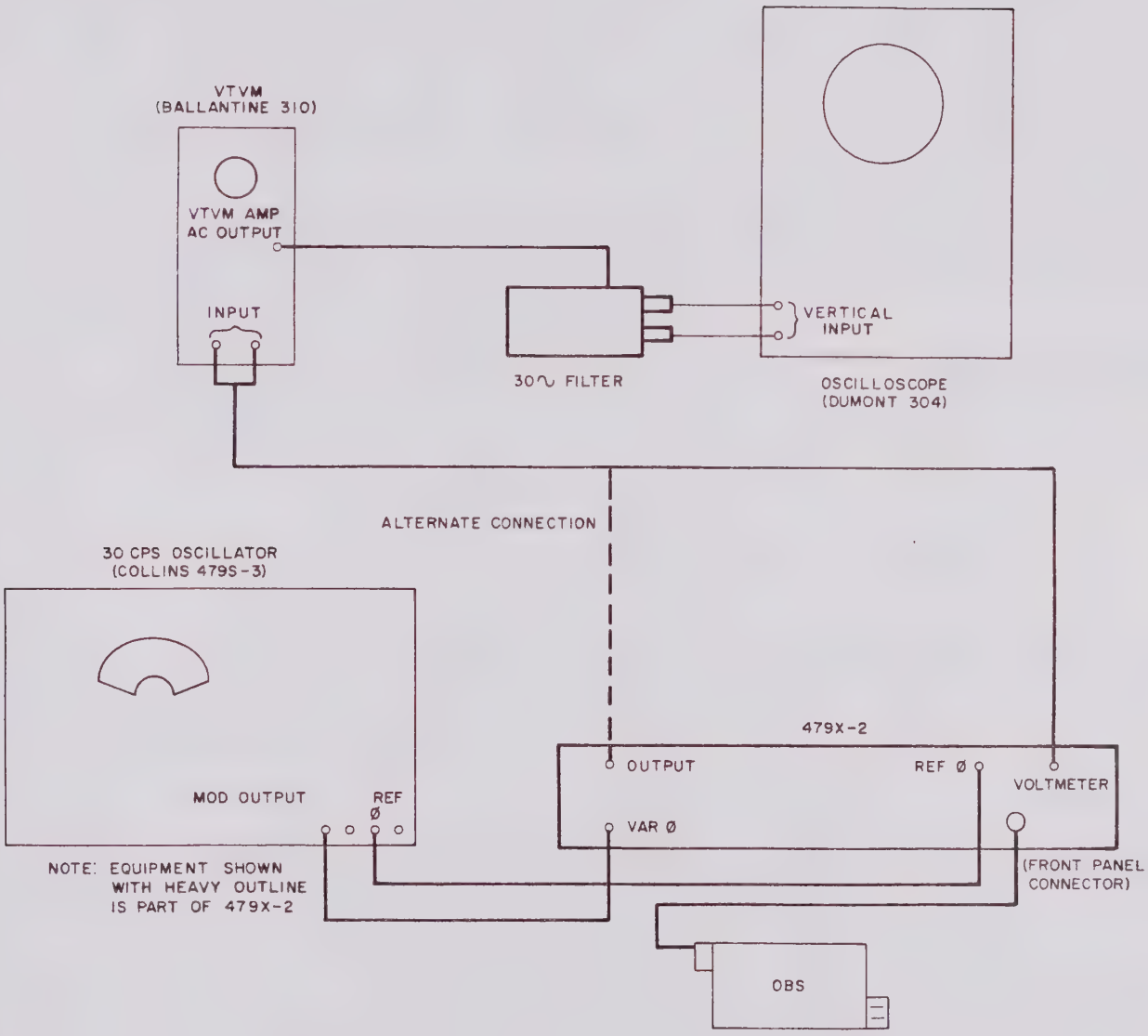


Figure 4-4. Test Setup for Calibration

NOTE

Do not attempt to adjust the CAL Ø control for a null. The proper position of the CAL Ø control is the one that results in the best null when the AMP BAL control is adjusted.

f. Repeat steps c, d, and e and lock the CAL Ø control in position.

4.4 Setting ORZ.

4.4.1 GENERAL.

The procedure for indexing an omnibearing selector, using a 479X-2 calibrated as outlined above, is as follows:

a. Connect the equipment as shown in figure 4-5. The 30-cycle generator can be an audio oscillator capable of delivering 4.5 to 8 volts across a 2000-ohm load or it may be a VOR audio signal generator with an equivalent voltage output. The frequency of the 30-cycle source should be accurate within 1 percent. The oscilloscope is fed from the AC OUTPUT phone jack of the vtvm amplifier into the 30-cycle filter.

b. Set the selector switch to SET ORZ.

c. Adjust the INPUT LEVEL control for a level of 4.25 volts at the VOLTMETER jack.

d. Remove the lead from the 479X-2 VOLTMETER jack, and connect it to the 479X-2 OUTPUT jack.

e. Set the OBS dial to 300 degrees.

NOTE

Omit step e when calibrating 30-cps resolvers which do not have a dial.

f. Adjust the AMP BAL control, and rotate the resolver stator relative to the rotor until a null is obtained. Lock the resolver stator in place.

4.5 ORZ of Collins Equipment.

4.5.1 GENERAL.

All Collins 336A-2 Omnibearing Selectors and 337A-2 Omnibearing Indicators which were manufactured after April 1, 1954 have been zeroed by use of a 479X-2 in accordance with the recommendations of RTCA Paper No. 126-54/SC61-65.

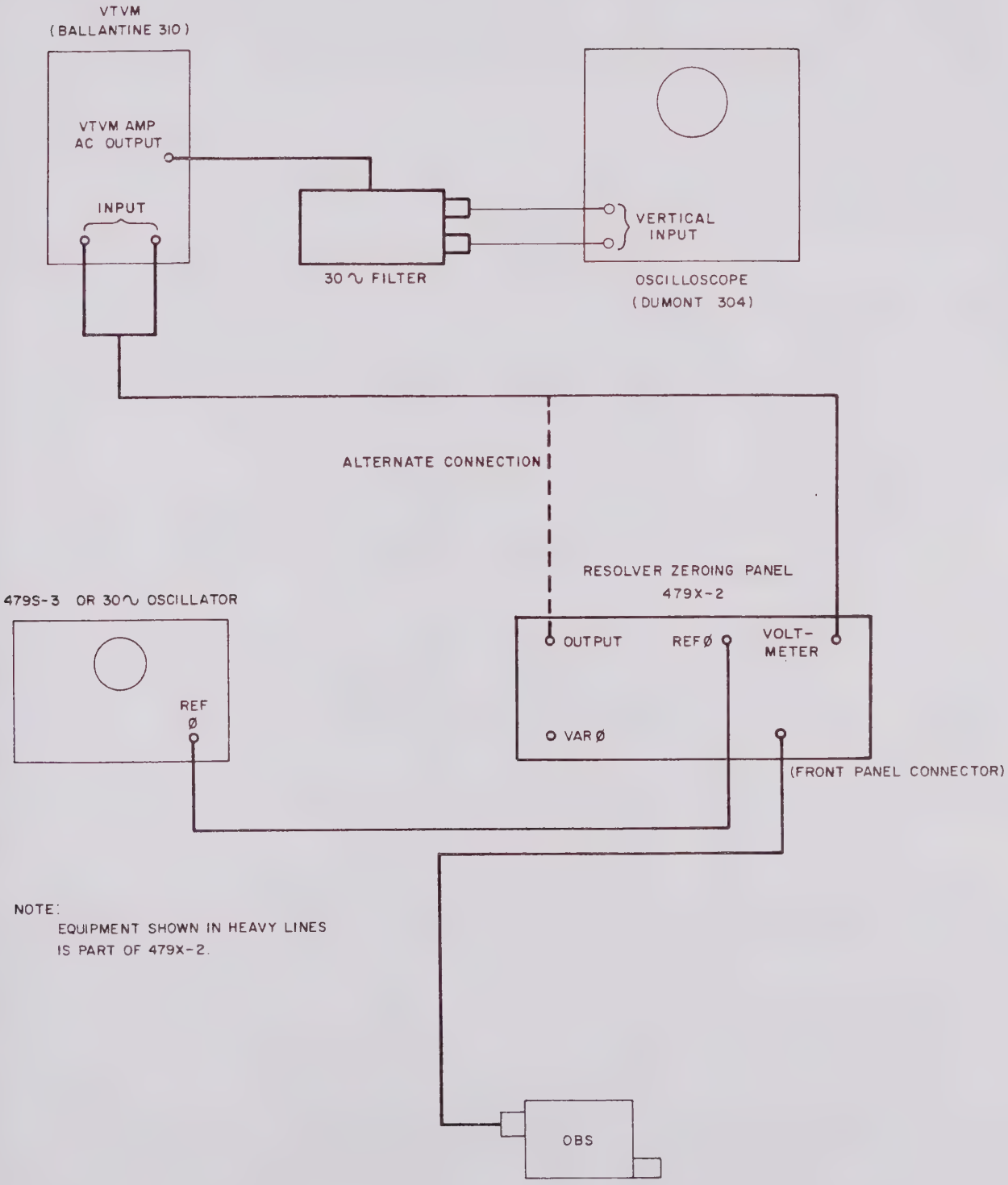


Figure 4-5. Test Setup for ORZ

section 5

parts list

5.1 Introduction.

5.1.1 General.

The purpose of this parts list is for identification, requisition, and issuance of parts.

Part numbers listed in this parts list meet critical equipment design specification requirements. Use only the part numbers specified in this parts list for replacement of parts.

5.1.2 Group Assembly Parts List.

FIG - ITEM Column — Digits preceding the dash refer to the figure number. Digits following the dash are the item numbers assigned in sequence to correspond with the item numbers on the illustration.

PART NO Column — Listed are MIL standard, vendor, or Collins Radio Company part numbers. Collins part numbering system consists of 10 digits as follows: a 3-digit family number, a 4-digit serial number, and a 3-digit dash number.

INDENT Column — Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column — Lists the noun name, modifier, required descriptive information, federal manufacturer code, reference designation, attaching part (AP), reference to other figures, and effectivities.

Attaching parts are identified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: MCN (Manufacturer Control Number) 101 and up, CI (Configuration Identifier) 5-digit number, REV (Revision Identifier) dash (-) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service Bulletins are identified by SB-1, SB-2, etc.

USABLE ON CODE Column — Part variations within the groups of equipment are indicated by a letter code (A, B, C, etc). The absence of the code indicates parts apply to all models.

UNITS PER ASSY Column — Quantities specified are per item number. The letters AR denote the selection of parts as required. The letters RF refer to an assembly completely assembled on a preceding figure and illustration.

5.1.3 Numerical Index.

PART NUMBER Column — Part numbers are listed in alphanumeric sequence.

FIG - ITEM Column — Digits preceding the dash refer to the figure number. Digits following the dash are the item numbers.

TTL REQ Column — Listed is the total quantity of parts or assemblies covered in the group assembly parts list.

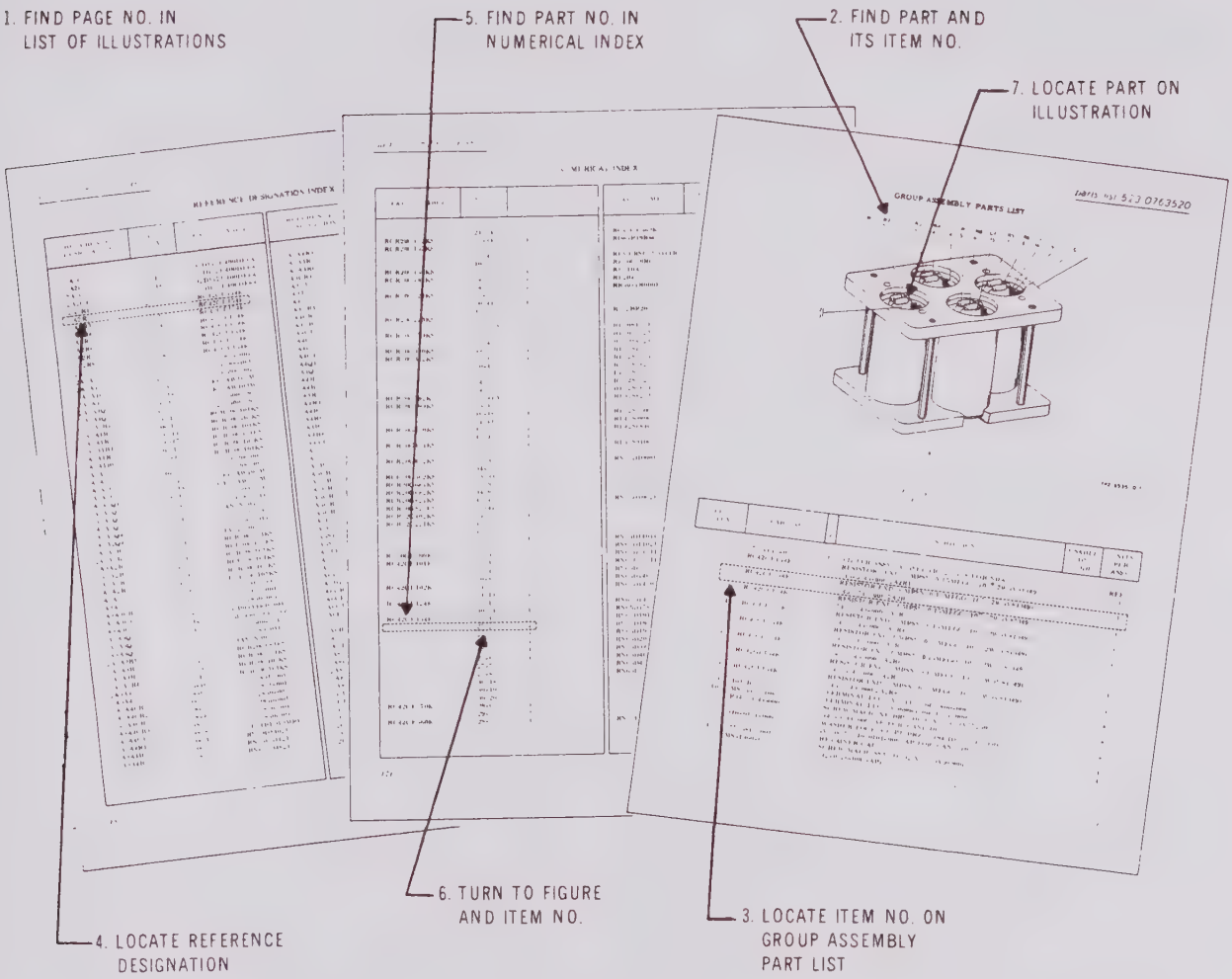
5.1.4 Reference Designation Index.

REFERENCE DESIGNATION Column — Reference designations are listed in alphanumeric sequence.

FIG - ITEM Column — Digits preceding the dash refer to the figure number. Digits following the dash are the item numbers.

PART NUMBER Column — Part numbers listed are for items that have reference designations assigned.

HOW TO USE THIS PARTS LIST


1. FIND PAGE NO. IN LIST OF ILLUSTRATIONS
5. FIND PART NO. IN NUMERICAL INDEX
2. FIND PART AND ITS ITEM NO.
7. LOCATE PART ON ILLUSTRATION
6. TURN TO FIGURE AND ITEM NO.
3. LOCATE ITEM NO. ON GROUP ASSEMBLY PART LIST
4. LOCATE REFERENCE DESIGNATION

HOW TO FIND THE PART NUMBER IF THE SECTION OR SYSTEM OF THE EQUIPMENT IN WHICH THE PART IS USED IS KNOWN:

(1) Refer to the List of Illustrations and find the page number for the Major Assembly or System in which the part is used.

(2) Locate the part item number and/or reference designation on the illustration.

(3) Find the item number on the Group Assembly Parts List page to determine complete description.

(4) If only the reference designation is known, refer to the Reference Designation Index to find the part number.

HOW TO FIND THE ILLUSTRATION FOR A PART IF THE PART NUMBER IS KNOWN:

(5) Refer to the Numerical Index and find the part number.

(6) Turn to the Group Assembly Parts List and find the first figure and item number indicated in the Numerical Index for that part. If this figure shows the part in a section or system of the equipment other than the one desired, refer to the other figure numbers listed in the Numerical Index.

(7) On the illustration, find item number determined in step (6).

5.1.5 Manufacturer's Code, Name, and Address

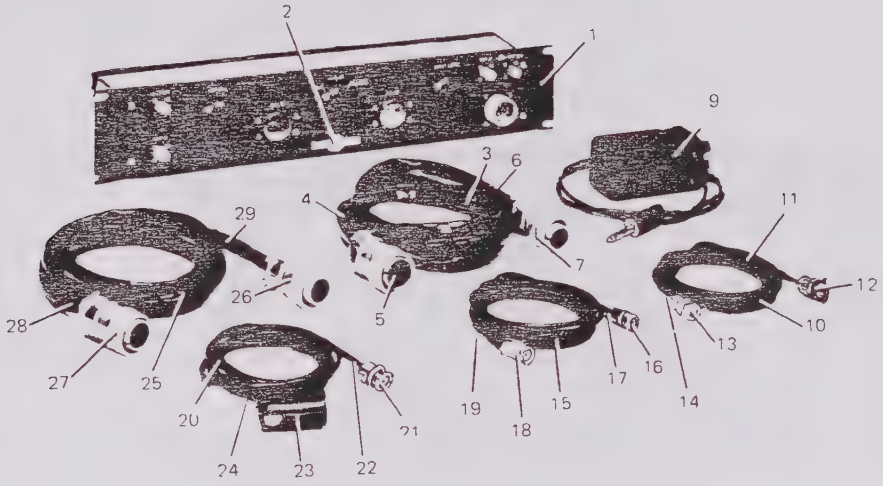
CODE	MANUFACTURER'S NAME AND ADDRESS
01884	Dearborn Electronics, Inc. P.O. Box 530 Orlando, FL 32802
37942	Mallory, P. R. and Co., Inc. 3029 E. Washington St. Indianapolis, IN 46206
58474	Superior Electric Co., The 383 Middle St. Bristol, CT 06010
73138	Beckman Instruments, Inc. Helipot Div. 2500 Harbor Blvd. Fullerton, CA 92634
73386	Freed Transformer Co., Inc. 1736 Weirfield St. Brooklyn, NY 11227
74048	Meyercord Co. 365 E. North Ave. Wheaton, IL 60187
76854	Oak Mfg. Co. Div. of Oak Electro/Netics Corp. S. Main St. Crystal Lake, IL 60014
78803	Trimm, Inc. 400 W. Lake Libertyville, IL 60048
80058	Joint Electronic Type Designation System
81349	Military Specifications
96791	Bunker-Ramo Corp., The Amphenol Controls Div. 120 S. Main St. Janesville, WI 53545
96906	Military Standards

5.1.6 Configuration Identifiers.

The following CI's/REV LTR were used in compiling data for this manual:

CI/REV LTR	UNIT PART NUMBER	FIG-ITEM
M	540-7245-000	5-1 - 25
L	540-7246-000	5-1 - 3
A	506-4851-002	5-1 - 10
65013	540-7244-000	5-3 - 9
K	522-0167-001	5-2 - 1

5.2 Group Assembly Parts List.

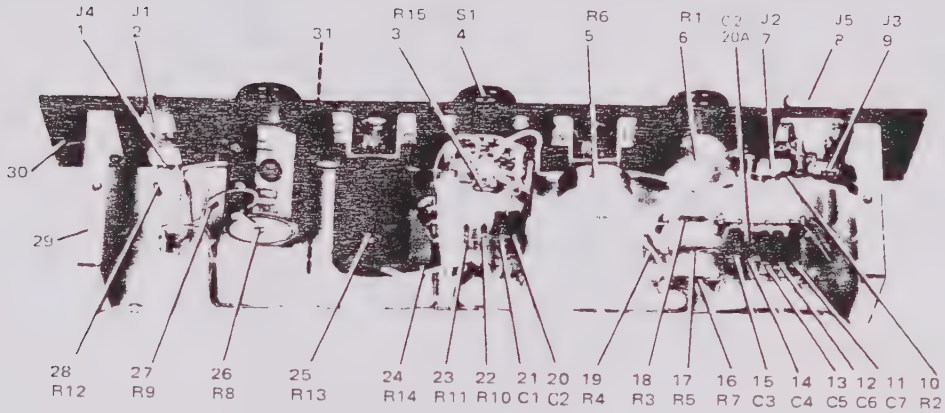


TP3-8630-017

Figure 5-1. 479X-2 Components

FIG - ITEM	PART NO	INDENT	DESCRIPTION	USABLE ON CODE	UNITS PER ASSY
5-1 -	522-0167-001	1	COMPONENTS 479X-2		1
1	NO NUMBER	2	PANEL, RESOLVER ZEROING 479X-2 (SEE FIG 5-2-)		1
2	280-3424-000	2	TRADEMARK		1
3	540-7246-000	2	CABLE ASSY		1
4	791-0762-001	3	MARKER , BAND		1
5	MS3106A18-1S	3	CONNECTOR,PLUG, ELEC (V96906) 357-4012-000		1
6	791-0762-002	3	MARKER , BAND		1
7	MS3106A18-1S	3	CONNECTOR,PLUG, ELEC (V96906) 357-4012-000		1
9	540-7244-000	2	FILTER, 30-CPS (SEE FIG 5-3-)		1
10	506-4851-002	2	CABLE ASSY		1
11	791-0764-001	3	MARKER, BAND		1
12	M39012-16-0001	3	CONNECTOR,PLUG, ELEC (V81349) 357-9292-000		1
13	M39012-16-0001	3	CONNECTOR,PLUG, ELEC (V81349) 357-9292-000		1
14	791-0764-002	3	MARKER, BAND		1
15	506-4851-002	2	CABLE ASSY		1
16	M39012-16-0001	3	CONNECTOR,PLUG, ELEC (V81349) 357-9292-000		1
17	791-0764-001	3	MARKER, BAND		1
18	M39012-16-0001	3	CONNECTOR,PLUG, ELEC (V81349) 357-9292-000		1
19	791-0764-002	3	MARKER, BAND		1
20	540-7247-00	2	CABLE ASSY		1
21	M39012-16-0001	3	CONNECTOR,PLUG, ELEC (V81349) 357-9292-000		1
22	791-0763-001	3	MARKER, BAND		1
23	1791	3	PLUG,TIP (V05276) 361-0037-000		1
24	791-0763-002	3	MARKER, BAND		1
25	540-7245-000	2	CABLE ASSY		1
26	MS3106A20-29S	3	CONNECTOR,PLUG, ELEC (V96906) 357-4004-000		1
27	MS3106A18-1S	3	CONNECTOR,PLUG, ELEC (V96906) 357-4012-000		1
28	791-0761-002	3	MARKER, BAND		1
29	791-0761-001	3	MARKER , BAND		1

GROUP ASSEMBLY PARTS LIST



TP3 8629 017

Figure 5-2. 479X-2 Resolver Zeroing Panel

FIG - ITEM	PART NO	INDENT	DESCRIPTION	USABLE ON CODE	UNITS PER ASSY
5-2 -	NO NUMBER	1	PANEL, RESOLVER ZEROING 479X-2 (SEE FIG 5-1-1 FOR NHA)		REF
2	UG290U	2	CONNECTOR,RCPT, ELEC (V80058) 357-9054-000 J1		1
3	RN20X2673F	2	RESISTOR,FXD, FILM, 267K, 1%, 1/4W (V81349) 705-2189-00 R15 (EFF TO CI 73026		1
3	RN60D2613F	2	RESISTOR,FXD, FILM, 261K, 1%, 1/4W (V81349) 705-6712-000 R15 (EFF CI 73026)		1
4	144194H1	2	SWITCH,RTRY (V76854) 259-0385-000 S1		1
5	M10MPX	2	RESISTOR,VAR, 10K, 10%, 2W (V37942) 377-0010-000 R6 (EFF TO CI 73263)		1
5	RA20LASB103A	2	RESISTOR,VAR,WW 10K, 10%, 2W (V81349) 750-8061-000 R6 (EFF CI 73263)		1
6	M5MPX	2	RESISTOR,VAR, 5K, 10%, 2W (V37942) 377-0009-000 R1 (EFF TO CI 73263)		1
6	RA20SASD502A	2	RESISTOR,VAR, 5K, 10%, 2W (V81349) 750-0503-000 R1 (EFF CI 73263)		1
7	UG290U	2	CONNECTOR,RCPT, ELEC (V80058) 357-9054-000 J2		1
8	MS3102A-18-10P	2	CONNECTOR,RCPT, ELEC (V80058) 357-3006-000 J5		1
9	UG290U	2	CONNECTOR,RCPT, ELEC (V80058) 357-9054-000 J3		1
10	RN20X2001F	2	RESISTOR,FXD, FILM, 2K, 1%, 1/4W, (V81349) 705-2138-00 R2 (EFF TO CI 70326)		1
10	RN60D2051F	2	RESISTOR,FXD, FILM, 2.05K, 1%, 1/4W (V81349) 705-6611-000 R2 (EFF CI 73026)		1
11	CM35EC103G03	2	CAPACITOR, FXD, MICA, DIEL, 10,000 PF 2%, 300V (V81349) 935-2391-000 C7 (EFF TO REV LTR J)		1
12	CM35EC103G03	2	CAPACITOR, FXD, MICA, DIEL, 10,000 PF 2%, 300V (V81349) 935-2391-000 C6 (EFF TO REV LTR J)		1
13	CM35EC103G03	2	CAPACITOR, FXD, MICA, DIEL, 10,000 PF 2%, 300V (V81349) 935-2391-000 C5 (EFF TO REV LTR J)		1

GROUP ASSEMBLY PARTS LIST

FIG - ITEM	PART NO	INDENT	DESCRIPTION	USABLE ON CODE	UNITS PER ASSY
5-2 14	CM35EC103G03	2	CAPACITOR, FXD, MICA, DIEL, 10,000 PF 2%, 300V (V81349) 935-2391-000 C4 (EFF TO REV LTR J)		1
15	CM35EC103G03	2	CAPACITOR,FXD, MICA, DIEL, 10,000 PF 2%, 300V (V81349) 935-2391-000 C3 (EFF TO REV LTR J)		1
16	RNZ0X2702F	2	RESISTOR,FXD, FILM, 27F, 1%, 1/4W, (V81349) 705-2165-00 R7 (EFF TO CI 73026)		1
16	RN60D2742F	2	RESISTOR,FXD, FILM, 27.4K, 1%, 1/4W (V81349) 705-6665-000 R7 (EFF CI 7326)		1
17	RN20X1202F	2	RESISTOR,FXD, FILM, 12K, 1%, 1/4W, (V81349) 705-2157-00 R5 (EFF TO CI 73026)		1
17	RN60D1212F	2	RESISTOR,FXD, FILM, 12.1K, 1%, 1/4W (V81349) 705-6648-000 R5 (EFF CI 73026)		1
18	RN20X4702F	2	RESISTOR,FXD, FILM, 47K, 1%, 1/4W, (V81349) 705-2171-00 R3 (EFF TO CI 73026)		1
18	RN60D4872F	2	RESISTOR,FXD, FILM, 48.7K, 1%, 1/4W (V81349) 705-6677-000 R3 (EFF CI 73026)		1
19	RN20X1801F	2	RESISTOR,FXD, FILM, 1.8K, 1%, 1/4W (V81349) 705-2137-00 R4 (EFF TO CI 73026)		1
19	RN60D1871	2	RESISTOR,FXD, FILM, 1.87K, 1%, 1/4W (V81349) 705-6609-000 R4 (EFF CI 73026)		1
20	CM35EC103G03	2	CAPACITOR, FXD, MICA, DIEL, 10,000 PF 2%, 300V (V81349) 935-2391-000 C2 (EFF TO REV LTR J)		1
20A	LP9A1A473J	2	CAPACITOR, FXD, PLSTC DIEL, 0.047UF, 5%, 50V (V01884) 933-1043-470 C2 (EFF REV LTR J)		1
21	CM35EC103G03	2	CAPACITOR, FXD, MICA, DIEL, 10,000 PF 2%, 300V (V81349) 935-2391-000 C1 (EFF TO REV LTR J)		1
21	LP9A1B223G	2	CAPACITOR,FXD, PLSTC DIEL, 0.022UF, 2%, 100V (V01884) 933-1043-450 C1 (EFF REV LTR J)		1
22	RN20X2673F	2	RESISTOR,FXD, FILM, 267K, 1%, 1/4W (V81349) 705-2189-00 R10 (EFF TO CI 73026)		1
22	RN60D2613F	2	RESISTOR,FXD, FILM, 261K, 1%, 1/4W (V81349) 705-6712-000 (EFF CI 73026)		1
23	RN20X2673F	2	RESISTOR,FXD, FILM, 267K, 1%, 1/4W (V81349) 705-2189-00 R11 (EFF TO CI 73026)		1
23	RN60D2613F	2	RESISTOR,FXD, FILM, 261K, 1%, 1/4W (V81349) 705-6712-000 R11 (EFF CI 73026)		1
24	RN20X2700F	2	RESISTOR,FXD, FILM, 270 OHMS, 1%, 1/4W (V81349) 705-2117-00 R14 (EFF TO CI 73026)		1
24	RN60D2610F	2	RESISTOR,FXD, FILM, 261 OHMS, 1%, 1/4W (V81349) 705-6568-000 R14 (EFF CI 73026)		1
25	205-578-1	2	RESISTOR,VAR, 1K, 5%, 5W (V96791) 377-0012-000 R13		1
26	SA1080	2	RESISTOR,VAR, 10K, 3%, 5W (V731381) 377-0209-000 R8		1
27	RN20X1002F	2	RESISTOR,FXD, FILM, 10K, 1%, 1/4W, (V81349) 705-2155-00 R9 (EFF TO CI 73026)		1
27	60D1002F	2	RESISTOR,FXD, FILM, 10K, 1%, 1/2W (V81349) 705-6644-000 R9 (EFF CI 73026)		1
28	RN20X4701F	2	RESITOR,FXD, FILM, 4.7K, 1%, 1/4W (V81349) 705-2147-00 R12 (EFF TO CI 73026)		1
28	RN60D4641F	2	RESISTOR,FXD, FILM, 4.64K, 1%, 1/4W (V81349) 705-6628-000 R12 (EFF CI 73026)		1
29	**540-7241-003**	**2**	**CHASSIS**		**1**
30	**540-7242-004**	**2**	**PANEL**		**1**
	280-5910-000	**2**	PLATE, IDENT **(EFF TO CI 69143)**		**1**
31	**756-7926-000**	**2**	**PLATE, IDENT (EFF CI 69143)**		**1**
32	**280-0450-000**	**2**	**DECAL (V74048) 280-0450-000**		**1**
- 33	503-2377-002	2	KNOB		3
- 34	540-7240-002	2	BRACKET		2

GROUP ASSEMBLY PARTS LIST

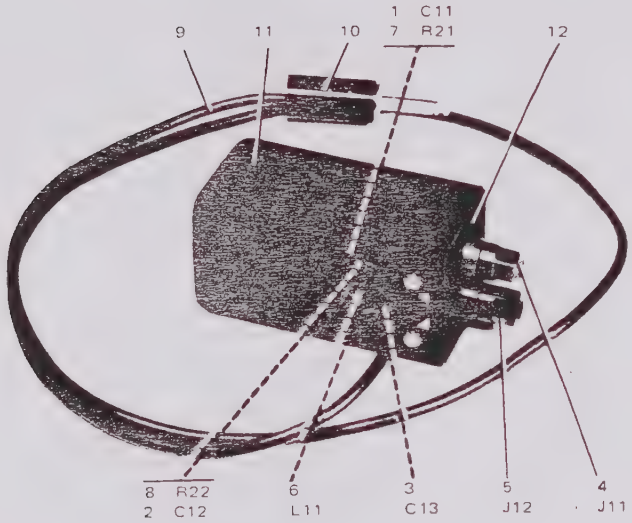


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Figure 5-3. 30-CPS Filter

FIG - ITEM	PART NO	INDENT	DESCRIPTION	USABLE ON CODE	UNITS PER ASSY
5-3 -	540-7244-000	1	FILTER, 30-CPS (SEE FIG 5-1-9 FOR NHA)		REF
1	LP9A1A473J	2	CAPACITOR,FXD, PLSTC DIEL, 0.047UF, 5%, 50V (V01884) 933-1043-470 C11		1
2	LP9A1A473J	2	CAPACITOR,FXD, PLSTC DIEL, 0.047UF, 5%, 50V (V01884) 933-1043-470 C12		1
3	LP9A1A473J	2	CAPACITOR,FXD, PLSTC DIEL, 0.047UF, 5%, 50V (V01884) 933-1043-470 C13		1
4	DF308C	2	POST,BDG (V58474) 372-1061-000 J11		1
5	DF30RC	2	POST,BDG (V58474) 372-1062-000 J12		1
6	24606	2	REACTOR, 8.1H (V73386) 678-0364-000 L11		1
7	RCR20G104KS	2	RESISTOR,FXD, CMPSN, 0.10MEGO, 10%, 1/2W (V81349) 745-1436-000 R21		1
8	RCR20G224KS	2	RESISTOR,FXD, CMPSN, 0.22MEGO, 10%, 1/2W (V81349) 745-1450-000 R22		1
9	RG58CU	2	CABLE,RF (V80058) 425-0042-000		AR
10	511	2	PLUG,TEL (V78803) 361-1040-000		1
11	540-7237-002	2	COVER		1
12	540-7236-002	2	COVER, BASE		1

5.3 Numerical Index.

PART NUMBER	FIG - ITEM	TTL REQ
CM35EC1-3G03	5-2-11	1
	5-2-12	1
	5-2-13	1
	5-2-14	1
	5-2-15	1
	5-2-20	1
	5-2-21	1
DF30BC	5-3-4	1
DF30RC	5-3-5	1
LP9A1A473J	5-2-20A	1
	5-3-1	1
	5-3-2	1
	5-3-3	1
LP9A1B223G	5-2-21	1
MS3102A-18-10P	5-2-8	1
MS3106A18-1S	5-1-5	1
	5-1-7	1
	5-1-27	1
MS3106A20-29S	5-1-26	1
M10MPX	5-2-5	1
M39012-16-0001	5-1-12	1
	5-1-13	1
	5-1-16	1
	5-1-18	1
	5-1-21	1
M5MPX	5-2-6	1
NO NUMBER	5-1-1	1
	5-2-	REF
RA20LASB103A	5-2-5	1
RA20SASD502A	5-2-6	1
RCR20G104KS	5-3-7	1
RCR20G224KS	5-3-8	1
RG58CU	5-1-20	1
	5-3-9	AR
RN20X1002F	5-2-27	1
RN20X1202F	5-2-17	1
RN20X1801F	5-2-19	1
RN20X2001F	5-2-10	1
RN20X2673F	5-2-3	1
	5-2-22	1
	5-2-23	1
RN20X2700F	5-2-24	1
RN20X2702F	5-2-16	1
RN20X4701F	5-2-28	1
RN20X4702F	2-2-18	1
RN60D1002F	5-2-27	
RN60D1212F	5-2-17	1
RN60D1871F	5-2-19	1
RN20X2673F	5-2-27	1
RN60D1212F	5-2-17	1
RN60D2051F	5-2-10	1
RN60D2610F	5-2-24	1
RN60D2613F	5-2-3	1
	5-2-22	1
	5-2-23	1
RN60D2742F	5-2-16	1
RN60D4641F	5-2-28	1
RN60D4872F	5-2-18	1
SA1080	5-2-26	1
UG290U	5-2-1	1
	5-2-2	1
	5-2-7	1
	5-2-8	1
	5-2-9	1
144194H1	5-2-4	1
1791	5-1-23	1
205-578-1	5-2-25	1

PART NUMBER	FIG - ITEM	TTL REQ
24606	5-3-6	1
280-0450-000	5-2-32	1
240-3424-000	5-1-2	1
280-5910-000	5-2-31	1
503-2379-002	5-2-33	3
506-4851-002	5-1-10	1
	5-1-15	1
511	5-3-10	1
522-0167-001	5-1-	REF
540-7236-002	5-3-12	1
540-7237-002	5-3-11	1
540-7240-002	5-2-34	2
540-7241-003	5-2-29	1
540-7242-004	5-2-30	1
540-7244-000	5-1-9	1
	5-3-	REF
540-7246-000	5-1-3	1
540-7247-000	5-1-20	1
756-7926-000	5-2-31	1
791-0761-001	5-1-29	1
791-0761-002	5-1-28	1
791-0762-001	5-1-4	1
791-0762-002	5-1-6	1
791-0763-001	5-1-22	1
791-0763-002	5-1-24	1
791-0764-001	5-1-11	1
	5-1-17	1
791-0764-002	5-1-14	1
	5-1-19	1

5.4 Reference Designation Index.

REFERENCE DESIGNATION	FIG - ITEM	PART NUMBER
C1	5-2-21	CM35EC103G03
C1	5-2-21	LP9A1B223G
C11	5-3-1	LP9A1A473J
C12	5-3-2	LP9A1A473J
C13	5-3-3	LP9A1A473J
C2	5-2-20	CM35EC103G03
C2	5-2-20A	LP9A1A473J
C3	5-2-15	CM35EC103G03
C4	5-2-14	CM35EC103G03
C5	5-2-13	CM35EC103G03
C6	5-2-12	CM35EC103G03
C7	5-2-11	CM35EC103G03
J1	5-2-2	UG290U
J11	5-3-4	DF30BC
J12	5-3-5	DF30RC
J2	5-2-7	UG290U
J3	5-2-9	UG290U
J4	5-2-1	UG290U
J5	5-2-8	MS3102A-18-10P
L11	5-3-6	24606
R1	5-2-6	M5MPX
R1	5-2-6	RA20SASD502A
R10	5-2-22	RN60D2613F
R10	5-2-22	RN20X2673F
R11	5-2-23	RN60D2613F
R11	5-2-23	RN20X2673F
R12	5-2-28	RN60D4641F
R12	5-2-28	RN20X4701F
R13	5-2-25	205-578-1
R14	5-2-24	RN20X2700F
R14	5-2-24	RN60D2610F
R15	5-2-3	RN20X2673F
R15	5-2-3	RN60D2613F
R2	5-2-10	RN20X2001F
R2	5-2-10	RN60D2051F
R21	5-3-7	RCR20G104KS
R22	5-3-8	RCR20G224KS
R3	5-2-18	RN20X4702F
R3	5-2-18	RN60D4872F
R4	5-2-19	RN20X1801F
R4	5-2-19	RN60D1871F
R5	5-2-17	RN20X1202F
R5	5-2-17	RN60D1212F
R6	5-2-5	M10MPX
R6	5-2-5	RA20LASB103A
R7	5-2-16	RN20X2702F
R7	5-2-16	RN60D2742F
R8	5-2-26	SA1080
R9	5-2-27	RN20X4002F
R9	5-2-27	RN60D1002F
S1	5-2-4	144194H1

REFERENCE DESIGNATION	FIG - ITEM	PART NUMBER

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1030412